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SIMULATING THE COOKING PROCESSES BY USING SIMULATION AND MODELLING TECHNOLOGY

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ABSTRACT

Presenting the real world system as a model is the basic idea behind simulation and modelling. System is a collection of entities which can interact with each other and can accomplish certain goal. Model is a representation of the system. Model can be used as a replacement of actual system for the purpose of study and research. Simulation is the imitation of operations of a real world process as it moves over Time. Cooking is a relevant technological process right from home to different food industries. It is important in the catering and hotel management institutes, fast food sector, catering services and production of prepared meals (ready-to-serve).Various cooking games are available but research on such simulator is ongoing. Responding to changing practice environments requires new models for training. A cooking simulator allows people to experience the thrill of cooking. Virtual environment for cooking and taste modelling concept can be added

KEYWORDS: System Modelling, Simulation, Artificial Intelligence, Virtual Learning Environment

INTRODUCTION

The objective of simulating the cooking processes by using simulation and modelling technology is to find the usefulness of mod-sim technique for a day to day activity by checking its positive and negative sides. This problem is also of interest in many training applications and has received attention from researchers in Artificial Intelligence and Virtual Learning Environment.

From years the popularity of food-related television programming and casual video games based on time management has been increased. The selection of cooking-themed video and computer games has become a favourite pass time and entertaining activity in recent years. If you enjoy cooking or just pretending to cook you can find a cooking game with a fair level of realism on virtually any game platform. This would be a serious computer-based simulation product endeavouring to model all the complexities of a full range of equipment, ingredients, their interactions, and their tastes.

Basically, the simulator would provide you with a virtual kitchen through in which dishes could be prepared with virtual ingredients. The software would have the knowledge of what happens when you slice ingredients, blend them, dice them, put certain ingredients together, what happens when you heat ingredients, cool them, mix them, etc. etc. Although it would be technologically difficult, the idea is to have fully fledged scientific modelling of what goes on during cooking.

RELATED WORK

There is a research going on for the development of such type of simulator. A cooking simulator is under development in Japan. This model in research allows people to experience the thrill of cooking even when their fridge is empty and their belly is full. It might also help them to utilize their skills so they don't overcook a pricey steak. The simulator features a "force feedback fry pan and spatula to accurately re-create the sense of cooking.

METHODOLOGY

In this research paper we are trying to focus on a working model design which will give feel like the real system of cooking in our kitchen. For that the following methodology can be applied, by using which we can build the model. This methodology can be applied to any user interactive model. It consists of following four steps which can be referred as IDEA which includes Initialization, Display, Events and Actions.

Initialization

It is the information gathering phase. The data required for simulating any system can be gathered by observing the actual working of real system. If real system is not present then various assumptions can be done based on historic data. Various objects required for simulating the system can be conceptualized based on the idea of the user. This gave rise to generation of various virtual objects also, which later can become part of the working model. The objects with which the user can interact are conceptualized in this phase.

For simulating cooking process, various objects that we need are cooking equipments like stove, cylinder, microwave ovens, fridge; utensils like pots, pans, spoons; ingredients vegetables, grains, water, oil, spices, fruits, milk etc can be firstly initialized by using any technology.

Display

After gathering the data and information and selecting the objects required for any model the next step is displaying that objects in such a fashion that they will look real and interactive. The shapes, sizes and colors of these objects are finalized in this phase. The look and feel of these objects should be like the real objects. So that the user will feel it like an interaction with the real system.

Events

Any activity which involves some time period of the system and which produces some output is called as an event. Event mainly involves the interaction of various objects with each other or with the user.

In cooking system if the user wants to try any new recipe, he can select his equipments and ingredients. It includes a display to show the user visible changes to their food caused by heating. See a steak go from red to brown and carrots blackened to a crisp and then he can do the work like chopping, cutting, kneading, fry etc.

Actions

When the system is responding to some inputs it is an event. And when the user is giving some input or he is responding to system's events it is called an Action.

Simple event could be when user of simulator tries some recipe and if he keeps on adding more quantity of salt or some spices, so simulator will respond to this event.

So when user adds some improper quantity of ingredients, simulator will quickly notifies the same, and user will take proper action.

Table 1: Objects in Cooking Simulator and their Usage in the Simulation

Sr. No.	Object	Usage
1.	Stove and Oven	To provide heat
2.	Pots	To cook food
3.	Pans	To fry and cook food
4.	Knives	To cut
5.	Serving Spoons	To steer
6.	Spices and salt	To provide taste
7.	Oil and water	To cook and fry
8.	Grains and vegetables	As Ingredients

MODEL DESIGN AND IMPLEMENTATION

Model Design

In first phase there is a designing of objects for a model. In this phase the designing of whole model can be done. This phase is like making the working model or prototype of working system. Model execution is taking trials of prototypes for checking the outputs. After executing prototypes for several times, the various outputs can be analyzed.

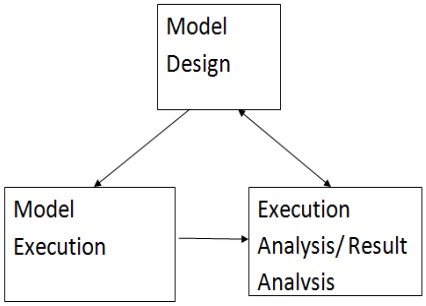

Figure 1: Model Design and Execution

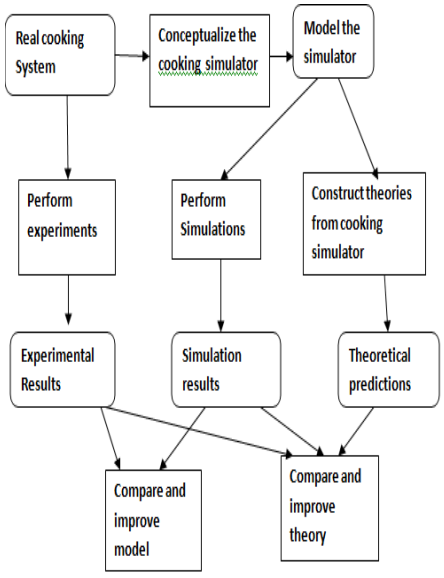

Figure 2: Flow Diagram of Simulation and Model Designing for Proposed Cooking Simulator

Implementation

The simulator can be implemented by using the simulation language like GPSS (General Purpose Simulation System). It is a very famous and easy to use discrete event simulation programming language. This language is well suited for problems like any manufacturing company or factory. Our proposed system i.e. the cooking simulator also falls into this category. So by using GPSS the proposed system can be designed. In GPSS, entities are called Transactions, and can be viewed as moving from Block to Block. A Block is a line of code and it represents unit actions that affect the Transaction itself or other entities. These other entities can be broadly classified in Resources, Computational entities and Statistical entities. Resources, like Facilities and Storages represent limited capacity resources. Computational entities, like variables, Functions and random generators are used to represent the state of Transactions or elements of their environment. Statistical entities, like Queues or Tables (histograms) collect statistical information of interest.

Sample Code of GPSS

The aim is to simulate the operation of a kitchen. User arrive and enter the kitchen, queue if the kitchen is busy, get their recipe on a first-come first-served basis, and then leave the kitchen. We wish to know the average and maximum waiting line as well as number of dishes.

```
SIMULATE;                Define model
*
*Model segment 1
*
GENERATE 10, 2;      user arrive every 10±2 mn
SEIZE John;          Capture the kitchen
ADVANCE12, 3;        Get a recipe in 12±2 mn
RELEASE John;        finish cooking
TERMINATE;           Leave the kitchen
*
*Model segment 2
*
GENERATE 250;        Timer arrives at time = 250 mn
TERMINATE 1;         Shut off the run
*
*Control cards
*
START 1;             Start one run
```

```
END;                    End model
```

This code is developed between the SIMULATE and END statements, and is divided into "model segments" and "control cards".

The first segment models users. The GENERATE block creates a flow of Transactions and schedules them to enter the model with an inter-arrival time uniformly distributed over the range 10±2. It is the programmer's responsibility to interpret this transaction as users and to understand that the time is to be counted in minutes. The Transactions start their existence in the GENERATE block and progress from Block to Block, according to certain rules, until they reach a TERMINATE which remove them from the model.

FUTURE WORK

In the future, we hope to pair the system with a meal we are actually cooking so that it could help us forecast how long to leave our food in the pan by giving a virtual peek at our steak in five minutes and 10 minutes. Or, if you spend too much time cooking just for the pleasure of cooking, the simulator will let you have all the fun without any obligation to eat the meal you prepare.

The software would also give a 'taste rating' to completed dishes. User settings could store preferences for hot/spicy food, sweets, etc., so the ratings would suit the current user. Basically, such software could give valuable cooking training and an opportunity to 'test' new dishes without wasting ingredients or making a mess. No washing up either!! You could have online/network simulation as well - cook with your friends, or attend a virtual cooking class with your favourite celebrity chef!

A more wacky addition to this idea is to have an online service where you send your simulated recipe data. A chef in a nearby company franchised kitchen (maybe one per city) then cooks the dish based on data from the simulator, and it is home delivered to your house!

CONCLUSIONS

Thus we can conclude that Modelling and simulation is a powerful method to evaluate the design of any system. Simulation models represent valuable knowledge and require considerable time and effort. We tried to model actual process in kitchen by using this technology.

We also conclude that with the use of such simulators the cooking processes will enhance in such a way that it will definitely become a part of further researches and innovations in hospitality management area as well as in field of simulators. Thus, **simulating the cooking processes by using simulation and modelling technology is definitely a Next Gen technology.**

REFERENCES

1. Hue. V., Fourquet, J-Y, Chiron. P, *Simulation & Modelling of virtual operators for workspace design.* IEEE transactions on computational Intelligence Methods and Applications.
2. Chang Liang Liu; Hong Wang; Jinliang Ding; Chenggang Zhen: An overview of modelling and simulation of thermal power plant; IEEE Transactions on Advanced Mechatronic Systems.

3. Schaus, V; Grossekatthofer, K; Ludtke, D; Gerndt, A. Collaborative Development of a Space System Simulation Model *IEEE Transactions on* Enabling Technologies: Infrastructure for Collaborative Enterprises (WETICE), 2011

4. Nicola Corriero; Pierpaolo Di Bitonto; Teresa Roselli; Veronica Rossano;Enrica Pesare Simulation of clinical cases for learning in e-health. INTERNATIONAL JOURNAL OF INFORMATION AND EDUCATION TECHNOLOGY ;VOL 4 NO 4,AUG 2014; PP: 378-382

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